

Observations of the Transit of Venus at Mauritius. By Lord Lindsay.

(Communicated in a Letter to the Astronomer Royal.)

I feel sure that you will be glad to hear that my expedition has been in a great measure successful. After a long passage from head winds and bad weather I arrived here on the 1st of November. By the 7th all my instruments were up and approximately adjusted; the weather at first was unfavourable, but latterly it has been fair. Mr. Gill has been able to get eleven entire sets, and four other sets, which combine with the former, of measures of the diurnal parallax of *Juno*, and which I hope, will give good results. For longitude determinations we have 25 or 35 occultations (I forget the number), beside other methods, moon culminations, &c. &c. You will have doubtless heard that my chronometers were sent to Rodrigues by the *Shearwater*, to assist Lieut. Neate in the determination of the difference of longitude between that island and Mauritius (Observatory). I intend to connect my station with Mr. Meldrum's observatory, and so fill up the gap by telegraph; I shall also lay down wires to the German station under Dr. Low.

The morning of the 9th was cloudy before sunrise and for a short time after. The first external and first internal contacts were missed from this cause. We did not see the Sun until 1<sup>h</sup> 2<sup>m</sup> after the first external contact, when it came out for a few minutes, when photographs and measures were obtained. It was not till 8 A.M. (local mean time) that it became fairly fine, and remained so, with small periods of cloud obscuration, until the end of the transit.

*Photography.*—I took 271 plates, out of which number perhaps one hundred (100) will be of value; cloud and the very high temperature of the camera were much against me. Temperature varying from 96° to 116°.

*Heliumeter.*—Mr. Gill obtained five (5) complete determinations of greatest and least distances of the centres of the Sun and *Venus*, besides nine measures of cusps and two separate determinations of the diameter of *Venus* near the end of the transit.

*6-in. Equatoreal.*—Dr. Copeland obtained with this Equatoreal and the Airy double-image micrometer, fifteen (15) measures of least distance of *Venus* from the Sun's limb, and ten (10) measures of cusps. Dr. Copeland also observed the last internal and external contacts with this instrument.

The images of *Venus*, one brought into contact with the other, and then slowly rotated by the position-circle, showed no symptom of oblateness (ellipticity). Dr. Copeland observed the second internal contact with full aperture and first surface reflecting plane. The second external contact was observed with the double-image micrometer; the images superposed on account of faintness of the images.

4-in. *Equatoreal*.—The last internal contact was observed with this instrument and the Merz Polarizing eye-piece by Mr. Gill. He also observed the last external contact with the heliometer.

Both Dr. Copeland and Mr. Gill agree that the contacts of *Venus* and the Sun are remarkably similar to those seen on the Model.

They also agree that any phenomena which could be classed under the head "Black Drop" took place and disappeared within a period of five (5) seconds.

*Time.—Transit Instrument.*—Very accurate determinations of the time were obtained on the six nights previous; and one star and azimuth-mark, on the night following, by Dr. Copeland with the 4-in. reversing transit.

All the photographic exposures are automatically registered on the chronograph by a method which gives the actual duration of the exposure.

The heliometer observations were also registered thus: Dr. Copeland observed eye and ear—all other observations (photographic and heliometric) were also observed eye and ear as a check on the chronograph.

During the actual work of the transit I had eight assistants, not counting myself or Mr. Davis. Mr. Gill had six, including the Hon. M. Connal, Surveyor General, to whom I am much indebted for valuable assistance. Dr. Copeland had three assistants. All these men formed part of the crew of my yacht—whom I have trained to the work.

I am happy to say that the German Expedition, under Dr. Low, got the third and fourth contacts, and three (3) complete sets of heliometer measures.

Also Mr. Meldrum got the second and third contacts, though rather uncertain as to the first internal contact, owing to cloud. Thinking that, possibly, he would not be able to get time determinations on the night of the 9th, I sent him a box of nine chronometers, which I have left with him for the rating of his clock.

May I ask you to be so good as to communicate this letter to the Royal Astronomical Society, as I have not time to write another account, as the mail goes to-morrow early.

P.S.—One of my photographs shows the second *internal contact* beautifully.

Belmont, *Mauritius*,  
1874, December 10.